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XXXIV. *An Account of several fiery Meteors seen in North America: In a Letter to John Pringle, M. D. and F. R. S. from John Winthorp, Esq; Hollifian Professor of Mathematics and Philosophy at Cambridge, in New England.*

S I R,

Read June 7, 1764. **I** Am greatly indebted to you for the honour you have done me in sending me your curious account of the late fiery Meteor in Britain, which I received through the hands of my very worthy friend Dr. Franklin. I have perused the account with great satisfaction, in which, as it appears to me, you have determined the figure, magnitude, height, path, and velocity of the Meteor, with as much exactness as the nature of the thing will admit of. The circumstances you mention, p. 259, 260, will, I am afraid, always prevent the attainment of the precision one could wish for in those particulars, so necessary for laying a sure foundation to build a theory upon. The hypotheses hitherto advanced are liable to great difficulties, and the hints you have given in the conclusion towards another appear intirely new, and free from several objections with which the others are embarrassed; and I should be very glad to see them thrown together into a just system. If any observations should occur to me, that might throw light on this difficult subject, I will do my self the honour to communicate them

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to you ; and ask leave, for my own information, just to query, what center these bodies may most probably be supposed to revolve round? Either the Earth or the Sun seem to bid fairest for this.

1. A body revolving round the Earth in a circle, at the height of about 40 or 50 miles, would move but 7 miles in a second ; and in a very eccentric orb, near a parabola, but 10 miles : which falls much short of the velocity of your Meteor, which was of 30 miles in a second *.

2. The Earth's annual velocity round the Sun is near 16 miles in a second ; and a body revolving in a very eccentric orb would have, at the same distance from the Sun, a velocity of 22 miles in a second. Wherefore if the Earth and such a body near it were moving in the same direction, that body would get before the Earth with a relative velocity of 6 miles in a second ; but, if moving the contrary way, it would be left behind with a relative velocity of 38 miles in a second : And this is the greatest possible relative velocity. Bodies moving in oblique directions may have any relative or apparent velocity less than this maximum. This supposition therefore agrees better with a velocity of 30 miles in a second, than the former ; but I shall be much obliged to you for your thoughts on this point.

As to our late Meteor of May 1759, I have not been able to come at any farther particulars than what are contained in my letter to Dr. Birch, excepting only as to the loudness of the report, at a great distance from the place of explosion. An intelligent man of this town has since informed me, that he was then fishing in a boat at anchor about a

* Vid. *Philos. Trans.* Vol. LI. p. 263.

mile below the light-house at the entrance of Boston harbour, and heard an uncommon noise, which was somewhat like that of a very hard clap of thunder at a great distance, tho' there was not a cloud to be seen. All the company in the boat were so startled at it, that they left off fishing to attend to it; and the noise increased to such a degree as amazed them all. He says, it seemed like a continued succession of volleys of small arms. He thinks it lasted about 3 minutes, and gradually went off towards the South-East. They took it for the noise of an earthquake, and expected to find every body talking of one, when they got ashore; tho' they could not perceive the least agitation in their boat.

Had this Meteor happened in the evening, instead of the day-time, it would have had many more observers; and the brightness of it would probably have been thought as extraordinary as the noise.

On this occasion I take the liberty to give an account of two or three other Meteors of this sort, seen in North America; which, if they are permanent revolving bodies, according to your hint, p 273. may possibly be of some service hereafter in enumerating them. The first mentioned in the inclosed paper I saw in this town; the second, I received an account of in a letter from the Rev. Mr. Clap, President of Yale College in New-Haven, who heard the noise himself, though he did not see the light; and the account of the third, here transcribed in the very words of the original, was given me at St. John's, Newfoundland, by Michael Gill Esq; Chief Judge in the courts there, when I went thither to
view

view the transit of Venus last June. None of these accounts are circumstantial enough to ascertain the necessary particulars of magnitude, height, and velocity. All I can collect from them is, that the height must have been very great, and consequently the explosion very great likewise, to produce such a report in a highly rarified medium.

Allow me, Sir, the honour of subscribing myself, with very great respect,

Your most obedient

Cambridge, New-England, Humble servant,
November 17, 1761.

John Winthrop.

Account of Three Meteors seen in North-America.

Read June 7, 1764. **O**N the 3d of June 1739, as I was walking over the common in this town [Cambridge] about 10 o'Clock in the evening, the Moon, which was newly past the first quarter, shining bright, and but few clouds to be seen, I was on a sudden surpris'd with four or five flashes of light, succeeding each other as quick as possible. This I at first took to be lightening; but, looking up, presently discovered the cause of it, which was a large Meteor moving almost in the meridian from South to North. The body of it was very bright, and left behind it
several

several sparks or lesser balls of light. When I first saw it, it was not far from the zenith, from whence it moved, not very swiftly, till at about the height of 30° above the horizon it expired. In about 2, it was followed by an hollow rumbling noise, pretty loud, and so much like remote thunder, that several persons in their houses, who did not see the Meteor, took it to be thunder; as others, within doors, who saw only the flash, and not the body of the Meteor, thought it lightened. But as there was no thunder nor lightening before or after, nor any clouds likely to produce them, as I was well assured, being then abroad, I question not but this report was occasioned by the explosion of the Meteor. And this is confirmed by the great extent of this sound, which was heard in several places above 80 miles distant from each other. And from hence, as well as from the length of time between the light and the noise, it may be collected that the Meteor must have been very high in the atmosphere.

II. A Meteor on the 24th of November 1742, in the Southern parts of New England.

In New Haven, in Connecticut, one man saw a ball of fire about 4. or 6 inches in diameter, passing along from the South-west to the North-east, and a stream of white, bright, and clear fire followed it, of near the same bigness, and of considerable length. Then the ball broke into sundry small pieces, and vanished with a kind of flash; and, a full minute after, he heard a noise, much like that of rumbling thunder, and, he says, about as long again as a clap of thunder usually is. — Sundry people at Rehoboth, in this province [Massachusetts] saw a ball of about
 4 a foot

a foot diameter, toward the West from them, and it fell to the ground. — At New-London, in Connecticut, the stream of fire appeared in the North or North-west; and some who were off at sea, near New-London, took the noise to be from great guns at New-London battery. — Mr. Clap observes, that, though the informations he had received differ as to particular circumstances, thus much in general seems to be certain, that people in most, if not all the towns between Norwalk, near the West end of Connecticut, and Braintree near Boston, which is at least 200 miles, heard an unusual noise in the air, like thunder or the discharge of a cannon; and sundry people, in most places, about a minute or more before the noise, saw a ball or stream of fire in the air, moving in some form or other. It was cloudy in the morning, but about 11 of the clock, when this phenomenon happened, it was generally clear, and but few clouds to be seen.

III. A Meteor on the 4th of May 1760, at Newfoundland.

The deposition of James Cawley, master of the Sloop Content, taken before Michael Gill Esq; one of his Majesty's Justices of the peace for the district of St. John's, Newfoundland, sayeth, that, coming from the Banks of Newfoundland for this harbour of St. John's, being Sunday the fourth instant, about a quarter before twelve o'clock at night, being calm and the weather very clear and fair, then, near the mouth of this harbour, a sudden light shined, at which time we saw a fiery Comet or Meteor in the air, at first appearing in the shape of a flask or Florence bottle, which as it came nearer to us still increased in

in magnitude, making the air very hot, shooting from the North-ward to the South-west; sparks of fire darting from it, the bigness of a man's fist. It came very near us before it disappeared, when it seemed to us to be of the bigness of a ship's boat, with a long tail extending from it, attended with a noise like thunder. As it came near the water, the body appeared as black as pitch and then vanished; the tail remaining some minutes before it disappeared.

Signed,

James Cawley.

Sworn before Michael Gill,
the 15th of May, 1760.

The above was likewise attested upon oath by the subscribers, being sailors on board the said vessel, and at that time upon deck.

John Sullivan,

[A true Copy.]

Mark
Thomas + Frog.
of

The testimony of Richard King, which he is ready to make oath to, faith, that coming from Kitty-Vitty to St. John's on Sunday the 4th of May, between the King's Bridge and the Garrison, he saw towards the garrison as if there was a star shooting, falling greatly, but only it made too large *. It was as large as a man's head, and just before it came to the ground it broke all to pieces, which made like large sparks of fire flying from it; and in that time it was as light as ever he saw all day: And in less than two or three minutes there was a rumbling noise in the air, something like thunder.

Several other persons in St. John's were prodigiously surpris'd at the same light.

* His meaning seems to be, it was too large for a star.